



## Associations between ozone and morbidity using the Spatial Synoptic Classification system

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**Year:** 2011  
**Journal:** Environmental Health : A Global Access Science Source. 10

### Abstract:

**Background:** Synoptic circulation patterns (large-scale tropospheric motion systems) affect air pollution and, potentially, air-pollution-morbidity associations. We evaluated the effect of synoptic circulation patterns (air masses) on the association between ozone and hospital admissions for asthma and myocardial infarction (MI) among adults in North Carolina. **Methods:** Daily surface meteorology data (including precipitation, wind speed, and dew point) for five selected cities in North Carolina were obtained from the U. S. EPA Air Quality System (AQS), which were in turn based on data from the National Climatic Data Center of the National Oceanic and Atmospheric Administration. We used the Spatial Synoptic Classification system to classify each day of the 9-year period from 1996 through 2004 into one of seven different air mass types: dry polar, dry moderate, dry tropical, moist polar, moist moderate, moist tropical, or transitional. Daily 24-hour maximum 1-hour ambient concentrations of ozone were obtained from the AQS. Asthma and MI hospital admissions data for the 9-year period were obtained from the North Carolina Department of Health and Human Services. Generalized linear models were used to assess the association of the hospitalizations with ozone concentrations and specific air mass types, using pollutant lags of 0 to 5 days. We examined the effect across cities on days with the same air mass type. In all models we adjusted for dew point and day-of-the-week effects related to hospital admissions. **Results:** Ozone was associated with asthma under dry tropical (1- to 5-day lags), transitional (3- and 4-day lags), and extreme moist tropical (0-day lag) air masses. Ozone was associated with MI only under the extreme moist tropical (5-day lag) air masses. **Conclusions:** Elevated ozone levels are associated with dry tropical, dry moderate, and moist tropical air masses, with the highest ozone levels being associated with the dry tropical air mass. Certain synoptic circulation patterns/air masses in conjunction with ambient ozone levels were associated with increased asthma and MI hospitalizations.

**Source:** <http://dx.doi.org/10.1186/1476-069x-10-49>

### Resource Description

#### Exposure : ☐

weather or climate related pathway by which climate change affects health

Air Pollution, Meteorological Factors, Precipitation, Temperature, Other Exposure

**Air Pollution:** Ozone

**Temperature:** Fluctuations

**Other Exposure:** Spatial Synoptic Classification

**Geographic Feature:** 

resource focuses on specific type of geography

Urban

**Geographic Location:** 

resource focuses on specific location

United States

**Health Impact:** 

specification of health effect or disease related to climate change exposure

Cardiovascular Effect, Respiratory Effect

**Cardiovascular Effect:** Heart Attack

**Respiratory Effect:** Asthma

**Resource Type:** 

format or standard characteristic of resource

Research Article

**Timescale:** 

time period studied

Time Scale Unspecified